OFFICE OF MANNED SPACE FLIGHT PROGRAM DIRECTIVE	M-D ML 3200.115 (Project)	DATE OCT 10 1969

APOLLO APPLICATIONS
PROGRAM DIRECTIVE NO. 26

REFERENCE COPY

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FROM: DIRECTOR, APOLLO APPLICATIONS PROGRAM

JECT: Intercenter Responsibilities for Support and Preparation of KSC Test and Checkout Plans and Procedures

: (a) AAP Directive No. 12, Prelaunch and Checkout of Center Developed (In-House) Flight Hardware for the Apollo Applications Program, dated March 15, 1968
(b) Apollo Program Directive No. 26B, Preparation of Test and Checkout Plans and Procedures at KSC, dated December 6, 1967
(c) NHB 8080.3, Apollo Applications Test Requirements, dated October 13, 1967
(d) NASA Administration Letter of September 10, 1968, Subject: AAP Management
(e) AAP Directive No. 11, Sequence and Flow of Hardware Development and Key Inspection, Review and Certification Checkpoints, dated February 26, 1968

PURPOSE:

This directive establishes intercenter requirements and responsibilities for the preparation and control of test and checkout plans and procedures required for the preparation and launch of AAP space vehicles, including experiments, at KSC.

SCOPE:

This program directive defines the requirements, responsibilities, intercenter coordination, and review necessary for the development, revision, and execution of Test and Checkout Plans and Test and Checkout Procedures applicable to AAP hardware at KSC. Utilization of Development Center personnel to accomplish prelaunch checkout and launch of AAP flight hardware developed in-house by MSC and MSFC are defined in reference (a).

This directive is based on the concept outlined in Apollo Program Directive No. 26B, reference (b), modified as necessary for the Apollo Applications Program.

The scope of this directive does not include the program and mission support requirements identified in the Manned Space Flight Requirements Documentation Manual, dated February 1, 1969, (Revision 2). It does not include the intercenter responsibilities and requirements between the Experiment Development Center and the Experiment Integration Center.

IMPLEMENTATION AND ENFORCEMENT:

The Apollo Applications Program Managers of KSC, MSC and MSFC are responsible for taking action as necessary to implement this directive. Intercenter problems arising from this implementation, or noncompliance, which cannot be resolved at the Center level shall be brought to the immediate attention of the Apollo Applications Program Director.

GENERAL PROVISIONS:

A. MSC and MSFC are responsible for defining specific requirements for test and checkout that must be performed on flight vehicles and integrated modules including experiments at KSC prior to flight. The combined factory, integration, and prelaunch requirements for test and checkout shall provide an integrated flow of testing and shall provide for verification of the functional performance of essential systems without unnecessary duplication. To the extent practicable, the overall test flow shall permit correlation of data between all testing sites for flight hardware. The documentation flow and time frames supporting the integrated test flow are graphically illustrated in Figure 1.

B. MSC and MSFC shall provide KSC with approved Test and Checkout Requirements Documents (TCRD) and Test and Checkout Specifications and Criteria Documents (TCSCD) covering the end items (e.g., stage or launch vehicle) and the integrated modules (including experiments hardware) delivered to KSC. Preliminary TCRD/TCSCD will be developed to enable advanced planning by KSC. The TCRD/TCSCD shall be in a standard format agreed to by, and mutually acceptable to the imposing and the implementing Centers and may be a combined document. The TCRD/TCSCD shall be based on end item, higher and/or lower level specifications as defined in paragraph 3.3 of reference (c), and be supplemented by test practices necessary to verify mission requirements.

To the maximum extent possible, existing (Apollo) TCRD/TCSCD Documents, or their equivalent, shall be used or updated for AAP application in lieu of generating complete new documents.

The documents shall clearly define the minimum test and checkout requirements to be accomplished at KSC and shall identify the specification performance values to be verified including the criteria, limits and red line values. Test methods, hardware configurations, critical test sequences, safety considerations/measures, crew participation requirements, hazardous operation identifications, emergency procedures, launch scrub/turn around requirements, and any other constraints shall be identified to the extent necessary to assure attainment of test objectives, to protect hardware from damage, and to assure personnel safety.

C. The integrated module TCRD/TCSCD for those modules (e.g., CSM) carrying or supporting experiments will be furnished by the Integration Center responsible for that module. This TCRD/TCSCD will include the requirements for the basic flight module, experiments, and other equipment which are stowed or operated in that module for launch, mission operation, or recovery. This document shall also include a section identifying off-module test requirements of experiments as required.

D. GSE/ESE at KSC shall normally be checked out through self-verification procedures or other appropriate means prior to connection with each item of space vehicle hardware. For each new piece of GSE/ESE delivered to KSC or requirements for special/unique applications of existing GSE/ESE at KSC, appropriate specifications, requirements, validation procedures, drawings, schematics, etc. to enable GSE/ESE verification will be provided to KSC by the responsible Development Center. Experiment GSE requirements, etc. shall be provided to KSC by the Center responsible for the integration of the carrier module.

E. Applicable Test Plans and Procedures used at the integration site; end item, higher and/or lower level specifications; factory plans; drawings and other appropriate documentation shall be made available by MSC and MSFC to KSC according to mutually agreed documentation and delivery schedule.

F. KSC shall respond to these TCRD/TCSCD Documents by preparation of Test and Checkout Plans and Test and Checkout Procedures necessary to satisfy these requirements and verify: the launch facilities interface, compatibility with the Mission Control Center, Houston (MCC-H), the Manned Space Flight Network (MSFN), launch crew readiness, and range safety requirements. KSC plans and procedures shall be based on the requirements of reference (C) paragraph 3.4.3.1. KSC shall provide to MSC and MSFC copies of applicable KSC test plans for approval and released procedures for review and comment in accordance with Figure 1. Applicable existing Apollo Test Procedures shall be used or updated for AAP application in lieu of generating complete new documents.

G. Test and Checkout Procedures shall be standardized in regard to the following items.

(1) Major policy and procedure matters regarding preparation, review, approval and change cycle.

(2) Control, approval level and documentation of trouble shooting during the conduct of Test and Checkout Procedures.

(3) Extent of quality control participation and sign off during execution of Test and Checkout Procedures.

(4) Extent of safety and medical organization participation. (See NMI 8900.1)

(5) Recording and approval level for deviations encountered during implementation of Test and Checkout Procedures.

(6) Policy concerning multiple effectivity of Test and Checkout Procedures.

(7) Inclusion or exclusion of preparation steps in Test and Checkout Procedures.

(8) Recording of Operations Intercommunication System (OIS) channels during execution of Test and Checkout Procedures.

(9) Hazardous operations and critical test functions to be flagged with appropriate warning and caution notes.

H. Revisions to Test and Checkout Procedures shall be provided to test team members at least 48 hours in advance of the start of the test. Waivers to this requirement shall be approved at the organizational level established by the KSC Director.

I. The flight crew shall use KSC Test and Checkout Procedures when participating in flight hardware tests at the launch site. Flight crews shall come under KSC control during the time when they are actively participating in tests of flight vehicles except that the flight crew may take any action necessary for its safety.

J. Prior to initiating a test, all open work and all test constraints shall be reviewed and recorded against the hardware to be tested. A determination shall be made that the hardware (including GFE) is properly configured and that the Test and Checkout Procedure, Flight Crew Procedure (if applicable) and hardware are compatible. This determination shall be recorded and approved by KSC and contractor organizations involved in the test. The procedure for recording and the level of approval shall be as specified by the KSC Director. For tests involving flight crew participation, this determination shall have signature approval of MSC.

K. Prior to initiation of a test, a briefing shall be conducted for all key members (including flight crew if applicable) of the test team to review the sequence of test activities, the Test and Checkout Procedures, GSE to be used and any hazardous operations or emergency procedures.

L. Approval to initiate any tests (hazardous and non-hazardous) shall be at the organizational level established by the KSC Director.

M. Changes to TCRD/TCSCD and approved integrated module test and checkout plans made at KSC shall be approved by the responsible Center. Changes in flight hardware configuration and associated GSE effected at KSC shall be approved by the responsible Center prior to testing in accordance with prescribed procedures.

N. The AAP Program Managers at MSC and MSFC shall delegate the authority through their respective Center official channels either to KSC or to the appropriate on site official of their own organizations to approve real time deviations to Test and Checkout Procedures involving compromise in TCRD/TCSCD.

RESPONSIBILITIES:

A. MSFC

(1) Prepare appropriate documentation assigning responsibilities for functions and actions contained herein and in Figure 1.

(2) Establish and maintain TCRD/TCSCD which are necessary to assure flight readiness of flight hardware and experiments hardware for which they are the Development Center and/or Integration Center, and for orbital-assembly integration as defined in reference (d). Basically these are:

a. Launch Vehicle

b. S-IC Stage

c. S-IB Stage

d. S-II Stage

e. S-IVB Stage

f. IU (including Experiment Hardware)

g. ATM (including Experiment Hardware)

h. Payload Shroud

i. OWS and Experiment Hardware

j. AM/MDA and Experiment Hardware

k. Orbital-Assembly Integration

TCRD/TCSCD (paragraph IV B, C and D) shall be furnished at KSC at least 20 weeks prior to delivery of hardware to KSC. Preliminary TCRD/TCSCD for first items of new design shall be made available 5 months prior to CDR and updated 2 months after CDR in accordance with Figure 1 (reference (e)).

(3) Provide signature approval on KSC Test and Checkout Plans for the above within 4 weeks of receipt of the plans from KSC.

(4) Approve or disapprove deviations or waivers to TCRD/TCSCD other than those originally approved in KSC Test and Checkout Plans within 10 days after receipt from KSC.

(5) Review the KSC criteria for determining hazardous operations and notify KSC of any disagreement.

(6) Support KSC in the preparation, revision, and execution of KSC Test and Checkout Plans and Procedures as specified herein. For in-house hardware this support shall be in agreement with reference (a).

(7) Review and comment on KSC Test and Checkout Procedures in accordance with Figure 1 as deemed necessary.

B. MSC

(1) Prepare appropriate documentation assigning responsibilities for functions and actions contained herein and in Figure 1.

(2) Establish and maintain TCRD/TCSCD which are necessary to assure flight readiness of flight hardware and experiments hardware for which they are Development Center and/or Integration Center as defined in reference (d). Basically these are:

a. SM (including Experiment Hardware)

b. CM (including Experiment Hardware)

c. SLA

d. Crew Systems (including Life Support Provisions)

e. Medical Equipment (Non-Experiment)

f. MCC-H (interfacing with KSC)

g. MSFN (interfacing with KSC)

TCRD/TCSCD (paragraph IV B, C and D) shall be furnished to KSC at least 20 weeks prior to delivery of hardware to KSC. Preliminary TCRD/TCSCD for the first items of a new design shall be made available 5 months prior to CDR and updated 2 months after CDR in accordance with Figure 1 (reference (e)).

(3) Provide signature approval on KSC Test and Checkout Plans for the above within 4 weeks of receipt of plans from KSC.

(4) Approve or disapprove deviations or waivers to TCRD/TCSCD other than those originally approved in KSC Test and Checkout Plans within 10 days after receipt from KSC.

(5) Advise KSC by specifying in the TCRD/TCSCD the requirements for flight crew and/or flight control personnel participation.

(6) Provide approved flight crew procedures to KSC covering all flight crew participations in test or checkout operations no later than 8 weeks prior to these tests.

(7) Provide signature approval no later than $4\frac{1}{2}$ weeks prior to tests on KSC Test and Checkout Procedures and pretest reviews of spacecraft hardware (including GFE) for those tests involving flight crew participation. This signature approval shall insure that all flight crew peculiar procedures and changes thereto are incorporated in the procedure and are compatible with the flight hardware.

(8) Direct that flight crews report any deficiencies they encounter while participating in KSC tests to the KSC Test Conductor or during the post-test debriefing, so that the deficiency may be recorded and dispositioned using the same documentation system used by the test teams.

(9) Review KSC criteria for determining hazardous operations and notify KSC of any disagreement.

(10) Review and comment on released test procedures in accordance with Figure 1 as deemed necessary.

(11) Support KSC in the preparation, revision, and execution of KSC Test and Checkout Plans and Procedures as specified herein. For in-house hardware this support shall be in agreement with reference (a).

C. KSC

(1) Prepare appropriate documentation assigning responsibilities for functions and actions contained herein and in Figure 1.

(2) Establish and maintain TCRD/TCSCD for new developed GSE to support KSC areas of responsibility for GSE premate verification and the integrated space vehicle preparations. These areas of responsibility include integrated space vehicle testing, launch facilities verification, launch team readiness, compatibility with external interfaces, range and safety requirements, launch site/space vehicle/network interface compatibility, etc. These documents shall be prepared no later than 20 weeks prior to start of applicable tests.

(3) Develop integrated module stage or launch vehicle Test and Checkout Plans in agreement with paragraph IV F, and submit for review to MSC and MSFC 12 weeks prior to scheduled start of testing and obtain signature approval from MSC and MSFC at least 8 weeks before scheduled start of tests. Development of Development Center in-house hardware Test and Checkout Plan shall be in agreement with reference (a).

(4) Develop space vehicle test and checkout plan derived from requirements of TCRD/TCSCD (paragraph V C (2)) at least 8 weeks before start of space vehicle tests.

(5) Prepare, revise and execute Test and Checkout Procedures in accordance with paragraph IV F. Preparation of procedures for Development Center in-house hardware shall be in agreement with reference (a). A KSC Test and Checkout Procedure shall define the detailed step-by-step sequence of events in a specific test and shall be generated for each test during preparation and launch of flight vehicles. The procedure shall include the necessary instructions for emergency situations, safing of hardware, implementing emergency actions required to evacuate or safeguard personnel, and combat or limit the extent of the damage, should an emergency arise. These procedures shall be reviewed and approved by the KSC Safety Office for compatibility with existing safety directives (e.g., AFETR 127-1 and KMI 1701.1A). Factory or integration site test and checkout procedures which have been approved by the Development and Integration organizations shall be used as a baseline in the development of Launch Site Test and Checkout Procedures. Whenever possible, Test and Checkout Procedures written for use in the factory and integration site will be modified for use at the launch site to fit unique facility/GSE requirements, safety considerations, integrated space vehicle test requirements and to meet objectives in the Test and Checkout Plan.

(6) Assure that MSC flight crew and flight control personnel are integrated into the KSC test team for those tests in which they have a requirement to participate.

(7) Secure MSC signature approval in accordance with Figure 1 on Test and Checkout Procedures and changes thereto and the pretest reviews of flight hardware and Test and Checkout Procedure compatibility for those tests in which the flight crew and flight control personnel have a requirement to participate.

(8) Make final determination that Test and Checkout Procedures are adequate, safe and in accordance with TCRD/TCSCD, flight crew procedures and launch mission rules.

(9) Provide MSC and MSFC with KSC Test and Checkout Procedures in accordance with Figure 1.

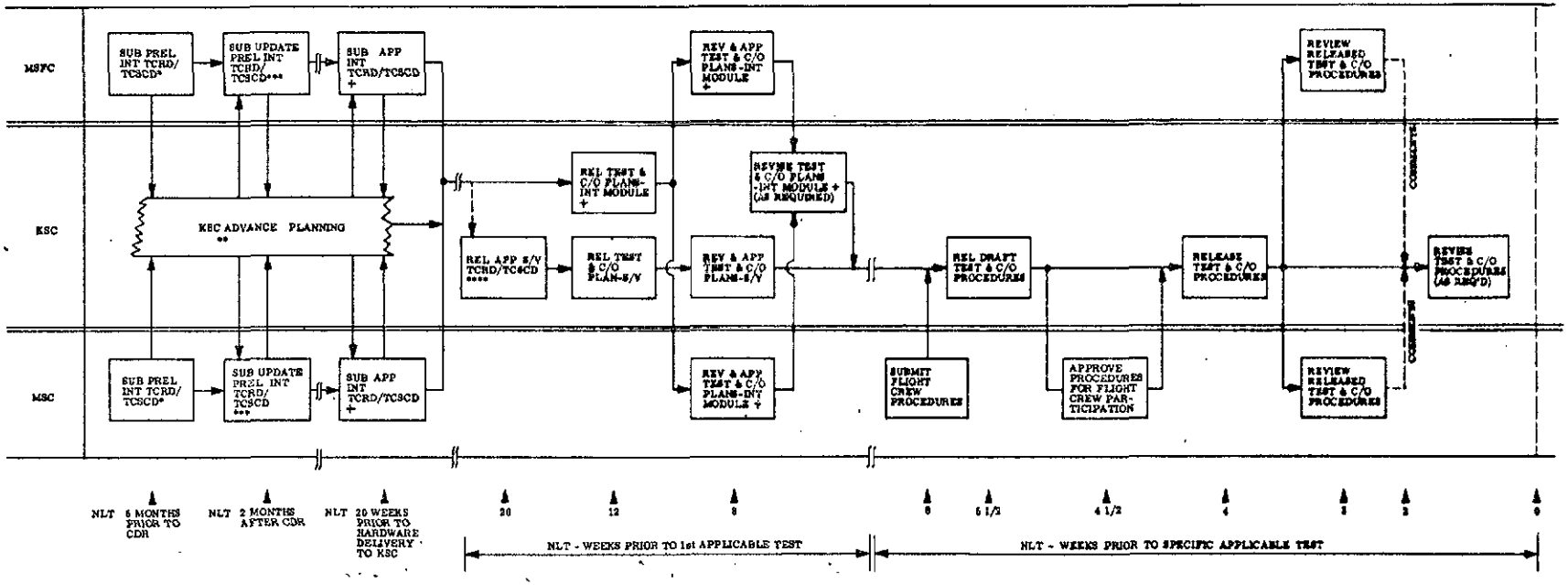
(10) Obtain deviations and waivers from Development and Integration organizations TCRD/TCSCD which cannot be fulfilled. Normally these deviations shall be identified in the KSC Test and Checkout Plan.

(11) Provide Test and Checkout Procedure control system which places positive control over changes subsequent to the distribution of approved Test and Checkout Procedures to the test team.

(12) Perform analysis of Test and Checkout Procedures deviations subsequent to completion of major tests for the purpose of reducing deviations in subsequent Test and Checkout Procedures.

(13) Provide MSFC and MSC with KSC advanced planning data based on preliminary TCRD/TCSCD in accordance with Figure 1.

FIGURE 1 AAP DOCUMENTATION FLOW FOR PREPARATION AND COORDINATION OF KSC TEST AND CHECKOUT PLANS AND PROCEDURES



NOTE: *DERIVED FROM SECTION 4 OF THE SI SPECIFICATION (PART I), HIGHER AND/OR LOWER SPECIFICATIONS WITH EMPHASIS ON:

- GROSS TEST REQUIREMENTS
- POTENTIAL SAFETY HAZARDS
- LONG LEAD ITEMS AND OTHER SIGNIFICANT CRITERIA AND CONSTRAINTS THAT IMPACT KSC.

**KSC ADVANCE PLANNING DATA FEEDBACK INCLUDES KSC TEST FLOW:

- TYPE OF TESTING
- TIME SPAN AND PHASING
- TEST LOCATION

***DERIVED FROM SECTION 4 OF THE SI SPECIFICATION (PART II), HIGHER AND/OR LOWER SPECIFICATIONS (REF.: PARA 2.3, AATR) AND BE SUPPLEMENTED BY TEST PRACTICES NECESSARY TO VERIFY MISSION REQUIREMENTS.

****BASED ON KSC OPERATIONAL REQUIREMENTS AND ARE COMPATIBLE WITH MSC AND MSFC TCRD/TCSCD. (SEE PARAGRAPH V.C.2).

+ INTEGRATED MODULE, STAGE OR LAUNCH VEHICLE.

LEGEND:

C/O - CHECKOUT	SUB - SUBMIT	TCRD - TEST AND CHECKOUT REQUIREMENTS DOCUMENT
INT - INTEGRATED	REV - REVIEW	TCSCD - TEST AND CHECKOUT SPECIFICATIONS AND CRITERIA DOCUMENT
S/V - SPACE VEHICLE	REL - RELEASE	APP - APPROVED
NLT - NOT LATER THAN	PREL - PRELIMINARY	

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MAS/Wagner (4)
MAS/Penn
MAT/King (5)
MC/Freitag
MCL/Ashley
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MM/Humphreys (2)
MMS/McLaughlin
M-N/Alibrando
MO/Turnock
MO/Stevenson (5)
MOR/Brown (10)
MOR/Chandler
MPP/Rafel (2)
MPR/Johnson
MS/White
MSR/Cianella
MTD/Lord (9)
MTG/Hall
MTX/Armstrong
MTX/Hall
MTY/Lohman
ML/Schneider
MLD/Disher
ML-1/Levenson
MLA/Culbertson (12)
MLO/Evans (5)
MLP/Field (14)
MLP-4/Koutsandreas (5)
MLP-5/Martin (3)
MLR/Cohen (5)
MLT/Savage (14)
MLS/Hagner (7)
MLV/Fero

OSSA

S/Naugle
SD/Nicks
SA/Jaffe
SB/Reynolds
SE/Johnson
SG/Mitchell
SL/Hearth
SV/Mahon

OART

RD/Lundin
RDA/Harper
RB/Jones
RE/Sullivan
RF/Ginter
RN/Woodward
RFE/Novik (5)
RP/Tischler
RV/Ames

XP/Jones (2)

OTDA

T/Truszynski
TD/Brockett
TA/Morrison
TS/Pozinsky
TR/Bryant

OPPA

PT/Maggin

GSFC

110/Stroud
800/Covington
810/Roberts
820/Wood
550/Vonbun

Morgan
Murphy (75)
K/Montgomery
AA-SVO/McCoy
AA-SVO/Shapbell
LO-PLN-2/Arbic (20)

MSC

KA/Thompson
KT/Douglas (50)
KT/Blount
KT/Richichi

MSFC

DIR/Von Braun
E/Maus
PM/James
PM-AA-MGR/Belew
PM-SAT-IB/MGR/Teir
PM-AA-AC/Wiggins
PM-AA-AT/Morse
PM-AA-AT/Belcher
PM-AA-EI/Hardy
PM-AA-EI/McDaris
PM-AA-EI/Marion
PM-AA-GE/Ogletree
PM-AA-IM/Kinser
PM-AA-MH/Daley
PM-AA/MHS/Cantrell
PM-AA-SW/Mullins
PM-AA-TQ/Chambers (50)
PM-MO/Speer
PM-PR-M/Goldston (70)
S&E/Weidner
S&E-ASTN-FI/Hill
S&E-CSE-V/Brooks
S&E-CSE-VA/Vedane
S&E-CSE-VA/Taylor
S&E-CSE/Riemer
S&E-QUAL-P/Hughes (30)
S&E-QUAL-P/King
S&E-QUAL-P/Jordan
S&E-QUAL-PC/Rosenthal
S&E-QUAL-PS/Hall

LaRC

DIR/Cortright (3)

LeRC

DIR/Silverstein (3)

ERC

DIR/Elms (3)

ARC

DIR/Mark (3)

Martin Marietta

Hurtt
Davis
Thackston
Crosier
Jakobsons